



**University of Colombo, Sri Lanka**

*University of Colombo School of Computing*



**DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY  
(EXTERNAL)**

Academic Year 2024— 2<sup>nd</sup> Year Examination — Semester 4

**IT4506 — Computer Networks**

*Part 2 - Structured Question Paper*  
(2 Hours for both Part 1 and Part 2)

**To be completed by the candidate**

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**Important Instructions**

- This paper has **two (2) parts, Part 1 and Part 2**.
- The total duration of **both Part 1 and Part 2 is 2 hours**.
- The final mark for the paper will be determined by averaging the scores of Part 1 and Part 2, each of which is graded out of **100**.
- The medium of instructions and questions is English. Students should answer in the medium of English language only.
- This paper (Part 2) has **2 questions on 7 pages**. Answer **both** questions.
- Write your answers **only on the space provided** on this question paper.
- Do not tear off any part of this question paper. Under no circumstances may this paper (or any part of this paper), used or unused, be removed from the Examination Hall by a candidate.
- Note that questions appear on both sides of the paper. If a page or part of a page is not printed, please inform the supervisor/invigilator immediately.
- Any electronic device capable of storing and retrieving text, including electronic dictionaries, smartwatches, and mobile phones, is not allowed.
- Calculators are **not allowed**.
- *All Rights Reserved*. This question paper can NOT be used without proper permission from the University of Colombo School of Computing.

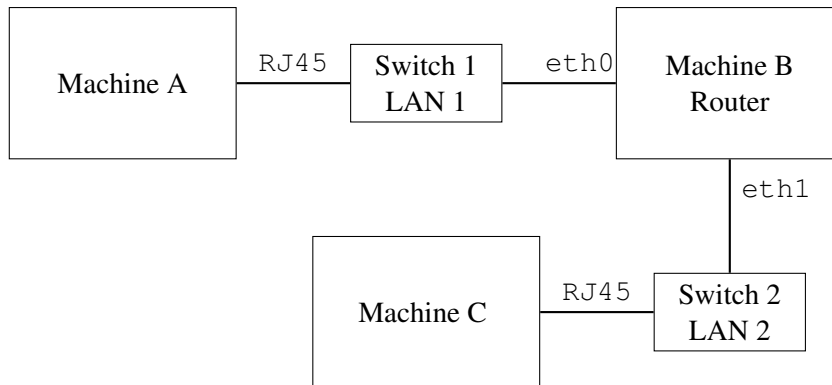
**To be completed by the examiners**

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<b>2</b>	
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1. Consider the network depicted in the following figure.



The interface of *Machine A* is configured with the IP address 192.168.1.2/30. A TCP connection is made from the port 5248 of the machine *Machine A* to the web server running on port 80 of the machine *C*. The IP datagrams received at *C* over this TCP connection have the source IP 192.168.1.2 and the source port 5248. The datalink frame containing the IP datagrams of the TCP connection received at *Machine C* has the source MAC address **08:00:27:f9:cf:12** and the destination MAC address **08:00:27:f9:cf:01**. The IP datagrams of the above TCP connection coming to *Machine A* have the source IP address 192.248.17.14. The *eth0* interface of *B* has the MAC address **09:00:27:f9:cf:02**. An ARP request issued for the IP address 192.248.17.1 received a reply with the MAC address **08:00:27:f9:cf:12**.

(a). What is the IP address of the interface *eth0* of *Machine B*? Justify your answer.

[10 marks]

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- (b). What is the MAC address of the interface `eth1` of *B*?  
Justify your answer.

**[10 marks]**

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- (c). What is the IP address assigned to the interface `eth1` of *B*? Justify your answer.

**[10 marks]**

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(d). What is the IP address of the only network interface of  $C$ ? Justify your answer.

**[10 marks]**

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(e). Does the TCP connection from  $A$  to  $C$  go through a Network Address Translator? Justify your answer.

**[10 marks]**

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2. (a). List down **four (4)** components of the *Transmission Control Protocol (TCP)* header other than the *source port* and the *destination port*.

**[4 marks]**

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- (b). Describe the process of connection release in *Transmission Control Protocol (TCP)*.

**[14 marks]**

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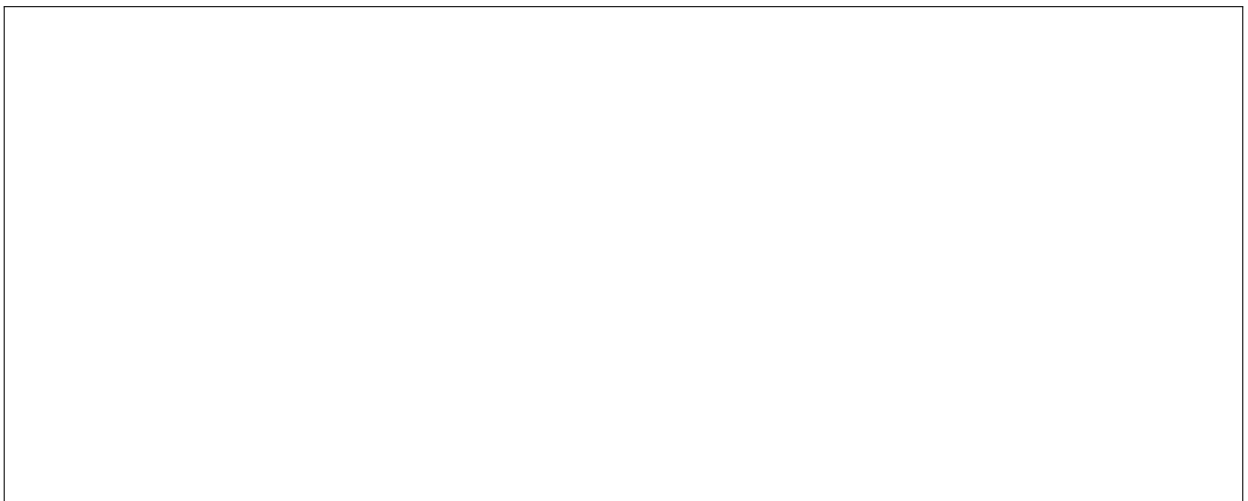
- (c). Explain the *hidden terminal problem* in wireless networks by illustrating the phenomenon using a suitable diagram.

**[12 marks]**



- (d). What is a **Virtual LAN (VLAN)**?

**[8 marks]**

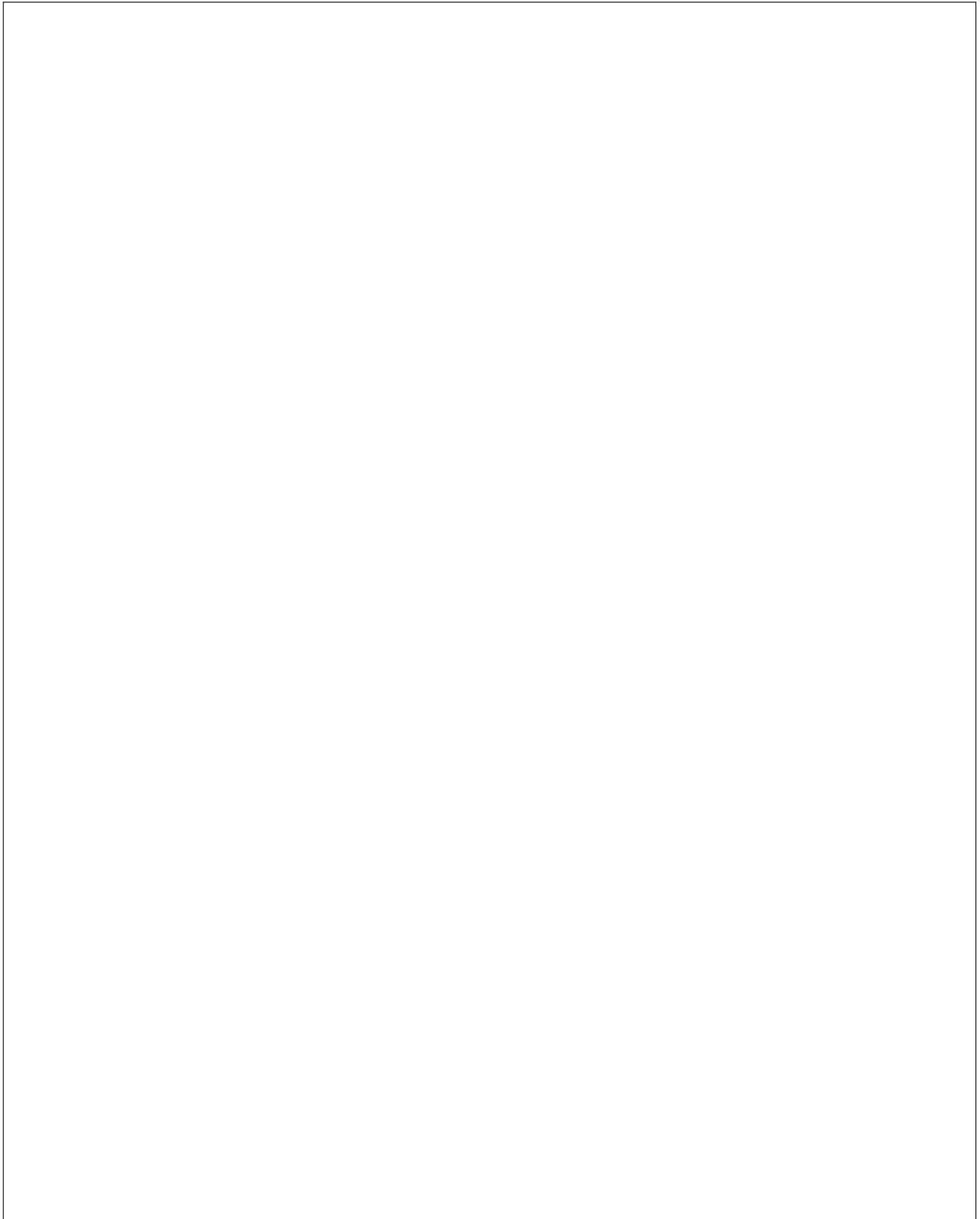


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- (e). Illustrate the architecture of the email system using a diagram by including all the necessary components.

**[12 marks]**



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